

## Claims

[c1]

1. A signal frequency splitter to derive  $n$  intermediate-frequency signals from a radio frequency signal, the signal frequency splitter comprising:  
 a frequency synthesizer, to synthesize a local carrier signal  $F_{b1}$  according to a system frequency signal  $F_s$ ;  
 $n-1$  first mixers  $M_{12}$  to  $M_{1n}$  coupled to the frequency synthesizers to mix frequencies of the local carrier signal  $F_{b1}$  and  $n-1$  differential frequency signals  $F_{d2}$  to  $F_{dn}$ , so as to obtain  $n-1$  local carrier signals  $F_{b2}$  to  $F_{bn}$ ;  
 $n$  second mixers  $M_{21}$ ,  $M_{22}$  to  $M_{2n}$  coupled to the first mixers and the frequency synthesizer to mix frequencies of the radio frequency signal and the local carrier signals  $F_{b1}$ ,  $F_{b2}$  to  $F_{bn}$  to obtain  $n$  intermediate-frequency frequency-mixed signals  $F_{m1}$  to  $F_{mn}$ ; and  
 $n$  filters coupled to the second mixers to filter the  $n$  intermediate-frequency frequency-mixed signals  $F_{m1}$  to  $F_{mn}$  to obtain  $n$  intermediate-frequency signals;  
 wherein  $n$  is a positive integer equal to or larger than 2.

[c2]

2. The signal frequency splitter according to claim 1, wherein the local carrier signals  $F_{b1}$  to  $F_{bn}$  include signals with frequencies of 26.995 MHz, 27.045MHz, 27.095 MHz, 27.145 MHz, 27.195 MHz, or 27.255 MHz, and a carrier frequency of the intermediate-frequency signal is about 455KHz.

[c3]

3. A signal frequency splitter, used to derive a first intermediate-frequency signal and a second intermediate-frequency signal from a radio frequency signal, the signal frequency splitter comprising:  
 a first mixer, to mix frequencies of a first local carrier signal and a differential frequency signal to obtain a second local carrier signal;  
 a plurality of second mixers, coupled to the first mixer to mix the frequency of the radio frequency signal with the frequencies of the first and the second local carrier signals to obtain a first and a second intermediate-frequency frequency-mixed frequency, respectively; and  
 a plurality of filters coupled to the second mixers to filter the first and second intermediate-frequency frequency signals to obtain the first and second intermediate-frequency signals.

[c4] 4. The signal frequency splitter according to claim 3, wherein the frequency of the first local carrier signal is 27.045MHz, the frequency of the second local carrier signal is 27.255MHz, and a carrier frequency for the first and second intermediate-frequency signals is 455KHz.

[c5] 5. A frequency shift key decoding apparatus, comprising:  
a frequency divider, to divide a frequency of a system frequency signal  $F_s$  into a plurality of differential frequency signals  $F_{d2}$  to  $F_{dn}$ ;  
a signal frequency splitter coupled to the frequency divider, to generate n local carrier signals  $F_{b1}$  to  $F_{bn}$  according to the system frequency signal  $F_s$  and the differential frequency signals  $F_{d2}$  to  $F_{dn}$ , the signal frequency splitter receiving a radio frequency signal and filter of the n local carrier signals  $F_{b1}$  to  $F_{bn}$  to obtain n intermediate-frequency signals; and  
a demodulator, coupled to the signal frequency splitter to decode the n intermediate-frequency signals to obtain n data;  
wherein n is a positive integer equal to or larger than 2.

[c6] 6. The frequency shift key decoding apparatus according to claim 5, further comprising a low-noise amplifier to amplify a signal received by an antenna to obtain the radio frequency signal.

[c7] 7. The frequency shift key decoding apparatus according to claim 5, wherein the signal frequency splitter comprises:  
a frequency synthesizer, to synthesize a local carrier signal  $F_{b1}$  according to a system frequency signal  $F_s$ ;  
n-1 first mixers  $M_{12}$  to  $M_{1n}$  coupled to the frequency synthesizers to mix frequencies of the local carrier signal  $F_{b1}$  and n-1 differential frequency signals  $F_{d2}$  to  $F_{dn}$ , so as to obtain n-1 local carrier signals  $F_{b2}$  to  $F_{bn}$ ;  
n second mixers  $M_{21}$ ,  $M_{22}$  to  $M_{2n}$  coupled to the first mixers and the frequency synthesizer to mix frequencies of the radio frequency signal and the local carrier signals  $F_{b1}$  to  $F_{bn}$  to obtain n intermediate-frequency frequency-mixed signals  $F_{m1}$  to  $F_{mn}$ ; and  
n filters coupled to the second mixers to filter the n intermediate-frequency frequency-mixed signals  $F_{m1}$  to  $F_{mn}$  to obtain n intermediate-frequency

signals;

wherein  $n$  is a positive integer equal to or larger than 2.

[c8]

8. The signal frequency splitter according to claim 5, wherein the local carrier signals  $F_{b1}$  to  $F_{bn}$  include signals with frequencies of 26.995 MHz, 27.045MHz, 27.095 MHz, 27.145 MHz, 27.195 MHz, or 27.255 MHz, and a carrier frequency of the intermediate-frequency signal is about 455KHz.